Perseus –
Development of binder-free Battery Electrodes

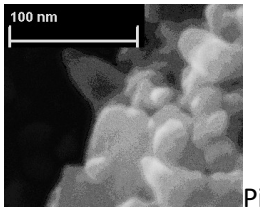
Abstract

Focus of the project PERSEUS is the development of a scalable process technology for the production of binder-free electrodes for the use in energy storage applications based on functionalised carbon nanohorns (CNH).

Details

Lithium-ion-batteries are currently the most powerful electrochemical energy storage systems available on the market. Mainly carbon-containing materials (e.g. conductive carbon black) are used for the transport of electric load. At the same time carbon is use as active storage material for lithium ions on the anode side. The access to active material for the liquid electrolyte is of major importance for an optimal charge exchange. This is enabled by an optimal pore structure which allows electrolyte to penetrate the electrode. The electrode does not only contain the carbon-containing active material but also a binder. This binder is responsible for the adhesion of the electrode on the current collector as well as for the connection between all parts of the electrode. The binder partially blocks the pore structure which partially prevents the optimal charge exchange and thus reduces the performance.

Aim of the project is to investigate the use of nano-scale carbon materials, namely (functionalised) Carbon Nanohorns (CNH), as substitute for the binder and conductive carbon material used in typical lithium-ion batteries. Advantage of CNHs is that they allow an open pore electrode structure as well as a very good adhesion to the current collector. An increase of the energy density of cells with the same structure like conventional, binder containing cells is possible due to this dual function of CNH.



Picture 1: FEM Picture of CNH (by Zeiss NTS 2011)

Project partner:

TIE GmbH, LSE - Lightweight Structures Engineering GmbH, VARTA Microbattery GmbH, Technische Universität Darmstadt – Eduard-Zintl-Institute for Inorganic and Physical Chemistry, Fraunhofer-Institute for Production Technology and Automation IPA

Supported by:

GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung

Represented by Project Management Jülich (PTJ)